



# Wrapped Up

APPLYING VINYL AS AN ALTERNATIVE TO PAINT

BY RANDY OTT







**M**Y MOTIVATION FOR VINYL-WRAPPING my Velocity stems from a combination of simple economic efficiency and my desire to learn how to do new things that create extraordinary results. It all started when I purchased N333RR at the Velocity factory in Sebastian, Florida. N333RR is a standard RG and had spent most of its 20-year life as a hangar queen.

In 2012, when 3RR emerged from hibernation, it received a fresh coat of paint. I don't know what kind of paint was applied, but by the time I purchased the aircraft its finish was seriously deteriorating. Scott Swing and the folks at the Velocity factory were gracious enough to sand down the worst of the worst and give me a nice coat of epoxy primer, and I flew my Velocity cross-country to its new home in Stockton, California, with epoxy primer on the top of the fuselage and the strakes. The wings were in slightly better shape, although they were still dull and deteriorating.

#### RENOVATIONS BY RANDY

I focused on upgrading the interior first. I had used a local gentleman for the interior of my previous plane, and I was very pleased with the quality of his work. However, his quote for the Velocity came in at \$7,500.

I had watched his crew work during that prior installation, and the process looked very straightforward. I know, those are a novice's famous last words right before he jumps in over his head. Fortunately, we live in the era of YouTube. I spent a few days reviewing instructional videos and gained enough confidence to tackle the project on my own. I bought identical materials to those quoted at \$120 per yard for just \$30 per yard online. I farmed out the actual seat upholstery to a local guy for \$1,000 and did the rest myself. The total project cost me \$1,700.

As part of the interior redesign, I used vinyl wrap to create a burl wood window trim effect around the cockpit's interior. This was another learning experience in which YouTube was my mentor and the school of hard knocks my playground. The finished project turned out about 1,000 times better than it had previously looked. It wasn't perfect, I made some mistakes along the way, but the results were still extraordinary!

With the interior (vinyl) wrapped up, my attention then turned to the exterior. I called a well-known paint shop in Salinas, California, for a quote. It said a basic Velocity paint job usually runs about \$12,000 — perhaps a bit more — depending on how much prep work is necessary. If I wanted a lot of fancy stuff, the price would, naturally, go up from there.

This was simply not in my budget, so I started searching for lower-cost alternatives. My first thought was to paint it myself. I found a place online that caters to people who want to paint their own aircraft. Their pictures all looked great, but the further I got into it, the more barriers popped up. I have a hangar partner. How would I protect his plane during this process? I would also need to build a ventilated paint booth — and the Velocity is a *big* airplane — so that wasn't the most viable alternative. Furthermore, I would need to obtain all the required spray equipment — *and* learn how to use it. On top of all that, the airport did *not* want me painting an aircraft in my hangar.



The seat upholstery is one of the few design elements I hired someone else to do. The burl wood window trim was created using vinyl wrap.



PHOTOGRAPHY COURTESY OF RANDY OTT



## NYL VIABILITY

I knew that vinyl had been successfully applied to other aircraft interiors, so I began investigating that alternative. I found some beautiful examples of vinyl-wrapped birds: everything from light airplanes to B-737s. My initial concern was, "Is that stuff really going to stay on?" I called some of the vinyl application places, all of which said that is the first question on everyone's mind. They have been applying vinyl to race cars for years — and now to large aircraft — and it's still not coming off.

The general consensus was that a vinyl application costs about 10 percent of what a standard paint job would run. This can be true if you desire several intricate graphics on your plane. I did much, much better.

Unlike paint, vinyl graphics are printed on the material before it is applied to the aircraft's exterior. Once the images are printed, there is a lamination process that puts a clear layer of vinyl over the top to lock in the ink. Another positive is that, unlike paint, the cost of elaborate vinyl imagery is basically the same as simple graphics. You are limited only by your design capability.

Application companies typically charge \$450-\$800 to come up with a design for your aircraft. With airplane graphics, everything has to be precisely aligned, and all curvatures need to be taken into account for the final application. It's a detailed installation process and it can say the least.

That got me to thinking: What if I don't want any sophisticated graphics? What if I treat it like a basic paint job, with a white base layer and then just apply whatever imagery on top, just as I would with any other installation? The cost savings of that approach was significant. Also, since most of the price of a vinyl wrap is the labor of installation, the savings would be even greater if I did it myself.

I watched hours of vinyl wrap installation videos on YouTube, and it looked like something I could do with a little practice. Next, I needed to decide which manufacturer's product to use.

I talked with Metro Restyling, a vinyl company based in Detroit. They recommended an Avery product because it is a bit more conformable than the 3M product similar to what I used on the interior, and it would be easier to use with the Velocity's numerous complex curves.

## PROTECTING YOUR INVESTMENT

To a great extent, the life span of a vinyl exterior is determined by the quality of the ink and its exposure to the sun. This is especially noteworthy for those who want to use intricate imagery. These days, most installations come with a five-year life span (based on full daylight sun exposure), after which your exterior will begin to fade and removal of the product will become more difficult. The gentleman I spoke with said they have 12-year-old installations (on hangared aircraft) that still look brand new.

I just wanted a bright shiny Velocity with a few accents that my wife would be proud to fly in, so I purchased a 60-inch by 65-foot roll of Avery SW900 Supreme Wrapping vinyl film in Gloss White. I also bought a handful of required application tools: several felt-tipped squeegees, a set of X-ACTO knives and blades, an adjustable heat gun, a lint-free cloth glove, a roll of fine filament vinyl cutting tape, and some 3M Adhesion Promoter. There were no ventilators, no spray guns, no body suits, no thinners — no toxic anything. I also didn't have to worry about overspray ruining my partner's plane — or the airport manager catching me and feeding me to the lions. Life was good!

## THE NITTY-GRITTY

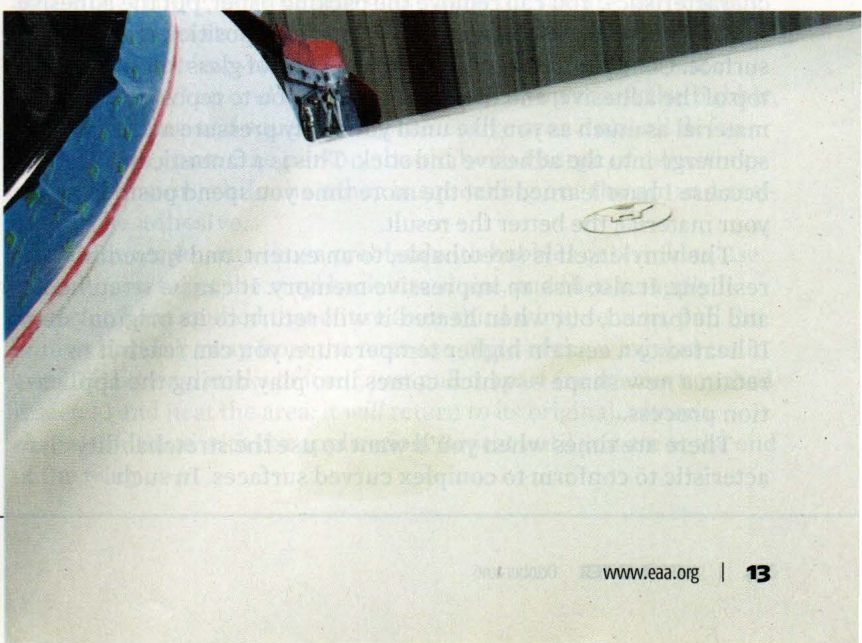
Everyone told me prep work is 90 percent of the project, but I think it's really more like 99 percent. I had never done any body work before, so I didn't know how much I really needed to do.

As soon as I got the vinyl, I was so excited that I immediately covered the access panel above the nose landing gear. It came out nice, though it had a noticeable amount of orange peel in the reflection. Scott had primed the plane for me, but I hadn't bothered to sand it.

The next easiest panel was the one over the canard, so I began by sanding this one with 220-grit sandpaper. It turned out much better than the nose gear panel so I knew all of the primed parts would need to be sanded. Upon further inspection, I noticed a few pinholes on the strakes that needed to be filled.

Next up, all the old pinstriping tape and N-numbers came off, which revealed aged paint and stripes underneath. These too would need to be sanded prior to vinyl application. I then began to sand.

Now: Each section had to be primed and sanded with 220-grit sandpaper before the vinyl could be applied.





My goal was not a perfect mirror finish, which I knew was above my paygrade. I just wanted something that looked acceptable. I started out with the 220-grit paper. The strakes are large surfaces — and they seemed to have a bit more orange peel — so I spent a few days hand-sanding them.

Since I knew the smoother the finish, the better the end product, I elected to follow up with 400-grit hand-sanding. Now I was left with the pinholes. I had used Bondo glazing compound on the interior to fill the weave of the fiberglass part before applying the vinyl, so I started to use that on the exterior. That's when I realized that what I had thought were a few pinholes were, in fact, hundreds of them — all over the strakes! I needed a better solution.

I went to my local auto body supply store, and it recommended Dolphin paste. It's the consistency of cake icing and covers large areas well. It is ready to sand in 10 minutes and sands easily. I spent the next several days filling and sanding. The paint on the wing had deteriorated in several areas, so I filled and sanded there as well. This tedious process seemed to go on forever, but I knew the vinyl application was inching closer and closer.

It took a solid week of filling and sanding before it was *finally* time to apply some vinyl. I elected to do the right wing first. My logic was to do the wing that I would be looking at the least first — just in case I messed it up. In hindsight, I should have started with a smaller area. A *lot* of learning happened on that wing — which was good, though if you look close, you can see it. My words of wisdom: Don't get excited. Practice plenty on test surfaces, then apply with confidence.

#### FROM THEORY TO APPLICATION

The vinyl comes in a roll 60 inches wide. It has a heavy paper backing that is removed prior to application. This type of vinyl is applied without liquid lubricant added during the process, which is why you need felt-tipped squeegees. If you use an ordinary squeegee, you'll scratch your precious shiny vinyl as you apply pressure to remove the air from underneath.

The Avery vinyl is a consistent 3 mm thick and has a pressure-sensitive adhesive on one side. Older styles of vinyl were prone to sticking together, as well as adhering prematurely to the application surface. Thankfully, modern products have wonderful repositioning characteristics. You can remove the backing paper, put the adhesive side down on your substrate, and still move/reposition it on your surface. Contemporary vinyls feature a layer of glass microbeads on top of the adhesive, and these beads allow you to reposition the material as much as you like until you apply pressure and the balls submerge into the adhesive and stick. This is a fantastic quality, because I have learned that the more time you spend positioning your material, the better the result.

The vinyl itself is stretchable, to an extent, and incredibly resilient. It also has an impressive memory. It can be stretched and deformed, but when heated it will return to its original shape. If heated to a certain higher temperature, you can teach it to retain a new shape — which comes into play during the application process.

There are times when you'll want to use the stretchability characteristic to conform to complex curved surfaces. In such

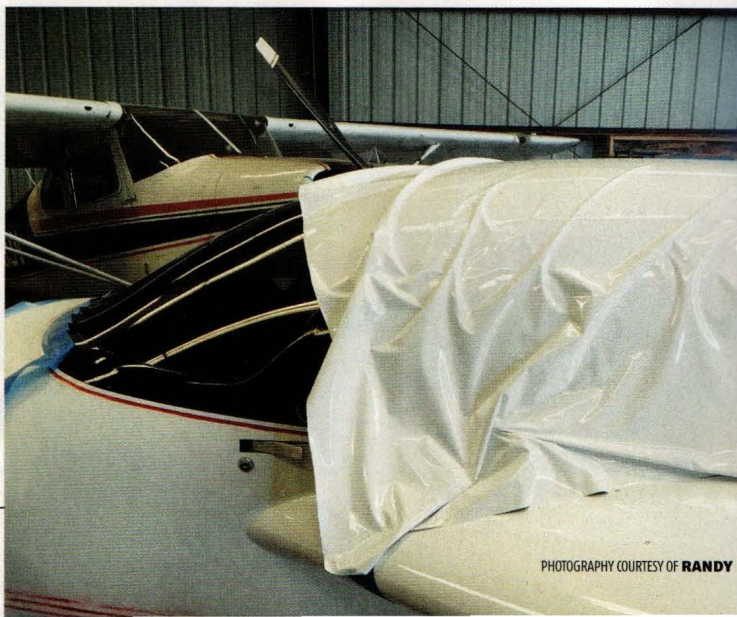


The access panel on the nose was the first section to be vinyl wrapped followed by the panel over the canard wing.



Above: The vinyl stretches to conform to the shape of whatever you're applying it to.

Below: The Avery vinyl uses a pressure-sensitive adhesive allowing for repositioning over large areas.

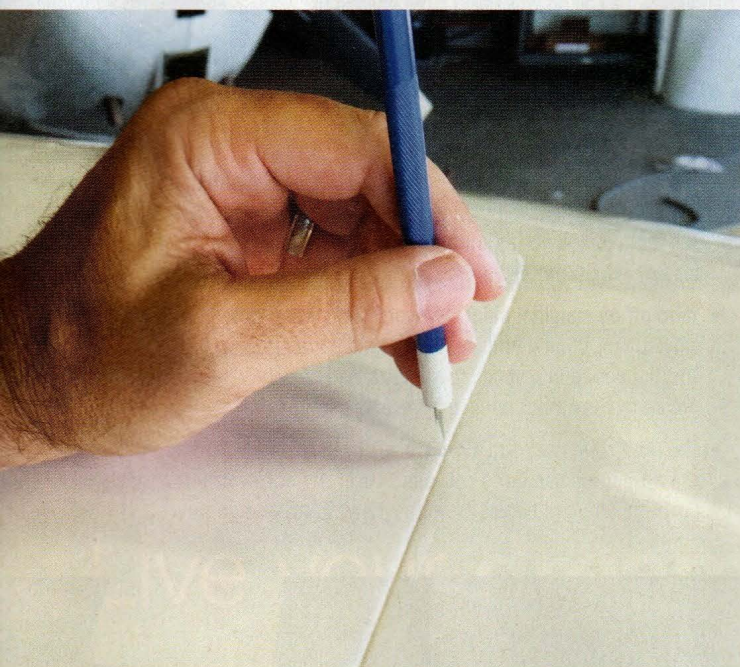


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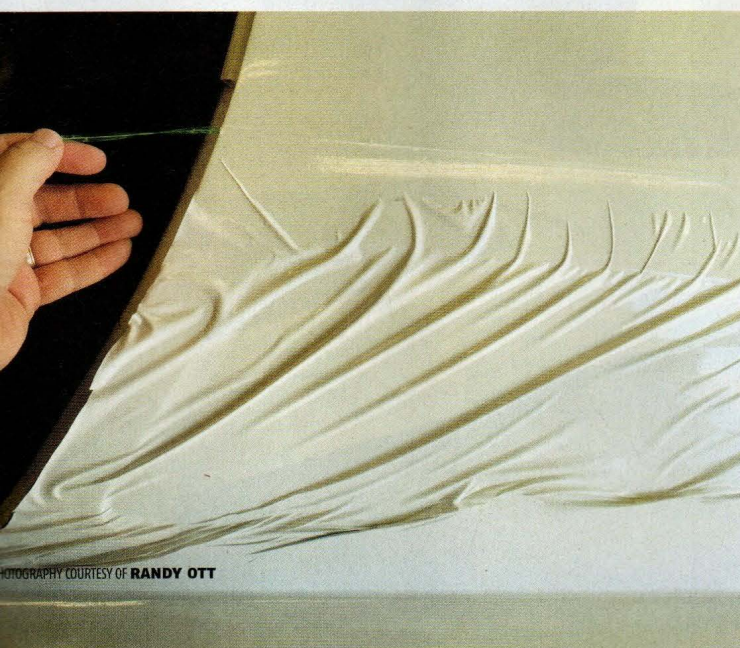




A felt-tipped squeegee was used to apply the vinyl to prevent scratches.



Above: I used an X-ACTO knife to trim unneeded material before application.  
Below: A heat gun can be used to restore the shape of the vinyl if wrinkles appear.



PHOTOGRAPHY COURTESY OF RANDY OTT

instances, you will heat a large area, stretch it over the curved surface(s), apply the adhesive pressure, and then go over it again with the heat gun to set the new shape. Without this final heating the vinyl will slowly try to return to its original shape, which can lead to lifting at the edges.

#### TENETS OF VINYL WORK

I cannot overstate how much you need an extra pair of hands while working with vinyl. It is *not* a pleasant experience to end up with a 15-foot-long bunch of rolled-up material all stuck to itself. The second most important thing is: cleanliness. Your surface *must be clean*, free of all dust, grease, cleaner residue — everything! We used Simple Green over the entire area and then followed up with 90 percent isopropyl alcohol. You should feel *no* grit or dust when you run your hand over the surface. We found that even the closed hangar had a lot of dust floating around. If we washed an area down, we would have to re-clean it the following morning. Once your area is immaculate, it's a good idea to apply a thin layer of 3M Adhesion Promoter to all the edges of your work. I applied it in about a 2-inch thick band. This will help ensure no lifting of the vinyl around the edges.

Measure the amount of vinyl you need and lay it out flat on your surface. Cut away any unneeded material; it will only get in your way later. Remove *all* of the backing paper. If you were doing the wing, you could remove at least one-third of the backing area without fear of it tangling up. Then, with two people, pull the sheet taut. Keep the vinyl tight at all times and try to keep it from folding on itself. Lay it back down gently and smoothly on your surface. Next, apply light pressure to the corners to stick them down a bit. You will have to pull up and reposition those corners several times, so don't stick them down too hard.

Gently pull and tug on the edges of the material. Your goal is to have it lay over the surface like a sheet — with no waves or wrinkles. Once the sheet is down smoothly, heat the entire surface to remove any remaining wrinkles. Next, pull the vinyl gently and snugly down on the underlying surface before using your felt-tipped squeegee to push the air out and apply the adhesive.

There are micro air escape paths built into the adhesive. Always work the air out from the middle toward the edges. Be aware that there *must* be an escape path for the air; work it out with slow, even strokes. If you rush it, you will most certainly create air bubbles, which can be removed by lifting the surrounding vinyl up and off the surface until you reach the bubble, then reheating and squeegeeing the entire area until all deformations are gone. One person should be in charge of adjusting surface tension while the other is squeezing out the air and activating the adhesive.

Whenever you run into a problem with bubbles or wrinkles, use the heat gun to get the vinyl back into shape, and then re-apply it. Once you have applied that entire (one-third wing) section, pull the bottom backing away from the next one-third of the wing and cut it away. If the vinyl sticks to itself, just pull it apart (no matter how bad it seems) and heat the area; it *will* return to its original, smooth shape. Continue with the application. Repeat until you are at the end of the wing.



## FINISHING TOUCHES

When attempting to tailor the vinyl to the curves of your Velocity, it is important to keep a few things in mind. Whenever you stretch the material, you don't want to just stretch it over a small area; you want it spread over a large surface area. For example, if you were coming to a corner or rounded contour, you would not want to heat a 2-inch band of vinyl to traverse the corner. You would instead want to heat a 10-inch band for before the corner *plus* a 10-inch band that would be applied beyond the corner. Then, you would gently stretch the entire 20-inch section around the corner/curve so that the material is applied evenly across the entire area. Small radius curves can be very challenging. If something doesn't work out, just pull it up, re-heat the vinyl, and try again. This is where the lint-free cloth glove comes in handy. The surface of the vinyl can get *very hot* when heated. At times, you'll need to heat the vinyl and then push it down into a recess before it cools. The glove allows you to do this, and provides a good amount of thermal protection for your fingers.

Once you have finished, you'll need to go over the entire surface again with the squeegee or a soft roller to activate *all* of the adhesive. Then, you'll need to take the heat gun and go over all of the surfaces where you had to stretch the vinyl. Once that's complete, it's time to trim off the excess vinyl. This can be done either with a sharp blade or with fine filament cutting tape. The tape is great because it allows you to make smooth, complex cuts without a knife. It's also easy to use. Simply lay down the tape where you want the cut to be — *before* you apply the vinyl. Next, lay the vinyl right over the top of it.

Once the vinyl is over the tape, just expose the filament, give it a quick tug, and it cuts a beautiful line in the vinyl right where you ran the tape. It's excellent for making straight lines or curves, and it works equally well on seams. When cutting with a knife, a sharp blade and a steady hand are key. I used an X-ACTO knife. Once you get the technique down, your finished product should look beautiful and will shine just like paint.

## RUNNING THE NUMBERS

In the end I used about 100 feet of Gloss White vinyl. I did *not* cover the bottoms of the wings, canard, or belly of the plane. Full aircraft coverage would have required approximately 160 linear feet of material. My total expenditures for materials and application tools came in at less than \$1,500. That figure includes the gold chrome accents, which are *very expensive*.

It took me about a month to do the project, working when I could. After prep work, I applied one element each day (i.e., a wing one day, a strake another day, etc.). One of the benefits of vinyl is that, unlike with paint, you can take your time and do one section at a time. If you mess up, just pull it off and start over. Time will tell how durable it will be and how it will hold up to our 200-mph slipstream. **EAA**

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## OTHER LESSONS LEARNED

- On our trip to Oshkosh, we ran into some light rain. I had applied some Gold Chrome vinyl to the winglets but did not buy enough material to completely wrap around the leading edge, which left the edge exposed to the airflow. The rain worked like a sandblaster on that exposed area. Be sure to wrap the leading edges completely when using specialty vinyl materials.
- Sand off *all* marginal paint. My worst spots were caused when I pulled up the vinyl to reposition it and chips of the old paint came up with the adhesive. This happened in several areas and caused unsightly bubble rash that could not be fixed without removing the entire section and starting over.
- The nose cone is a bear. Evenly heat the entire area, and pull the vinyl over the nose in one action. I could not cover the nose without a seam. Don't be afraid of curves or seams. Be patient, and go slow.

